WATER SUPPLY OUTLOOK
and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS
for
WESTERN UNITED STATES
Including Columbia River Drainage in Canada

UNITED STATES DEPARTMENT of AGRICULTURE···SOIL CONSERVATION SERVICE
Collaborating with
CALIFORNIA DEPARTMENT of WATER RESOURCES
and
BRITISH COLUMBIA DEPARTMENT of
LANDS, FORESTS and WATER RESOURCES

AS OF
FEB. 1, 1965

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

To Recipients of Water Supply Outlook Reports:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from advance estimates of the streamflow.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, up to 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1400 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

Streamflow forecasts are obtained by a comparison of total or maximum snow accumulation, as measured by snow water equivalent, to the subsequent spring and summer or snowmelt season runoff over a period of years. The snow water equivalent measured in selected snow courses provides most of the index to the streamflow forecast for the following season. More accurate forecasts are usually obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast procedure. Early season forecasts assume average climatic conditions through the snowmelt season.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions. Soil Conservation Service Reports may be secured from Soil Conservation Service, 511 N.W. Broadway - Room 507, Portland, Oregon 97209.

PUBLISHED BY SOIL CONSERVATION SERVICE

REPORTS	ISSUED	LOCATION	COOPERATING WITH
RIVER BASINS			
WESTERN UNITED STATES	MONTHLY (FEB.-MAY)	PORTLAND, OREGON	ALL COOPERATORS
BASIC DATA SUMMARY	OCTOBER 1	PORTLAND, OREGON	ALL COOPERATORS
STATES			
ALASKA	MONTHLY (MAR.-MAY)	PALMER, ALASKA	ALASKA S.C.D.
ARIZONA	SEMI-MONTHLY (JAN.15 - APR.1)	PHOENIX, ARIZONA	SALT R. VALLEY WATER USERS ASSOC. ARIZ. AGR. EXP. STATION
COLORADO AND NEW MEXICO	MONTHLY (FEB.-MAY)	FORT COLLINS, COLORADO	COLO. STATE UNIVERSITY COLO. STATE ENGINEER N. MEX. STATE ENGINEER
IDAHO	MONTHLY (JAN.-JUNE)	BOISE, IDAHO	IDAHO STATE RECLAMATION ENGINEER
MONTANA	MONTHLY (JAN.-JUNE)	BOZEMAN, MONTANA	MONT. AGR. EXP. STATION
NEVADA	MONTHLY (JAN.-MAY)	RENO, NEVADA	NEVADA DEPT. OF CONSERVATION AND NATURAL RESOURCES DIVISION OF WATER RESOURCES
OREGON	MONTHLY (JAN.-JUNE)	PORTLAND, OREGON	OREG. STATE UNIVERSITY OREGON STATE ENGINEER
UTAH	MONTHLY (JAN.-JUNE)	SALT LAKE CITY, UTAH	UTAH STATE ENGINEER
WASHINGTON	MONTHLY (FEB.-JUNE)	SPOKANE, WASHINGTON	WN. STATE DEPT. OF CONSERVATION
WYOMING	MONTHLY (FEB.-JUNE)	CASPER, WYOMING	WYOMING STATE ENGINEER

PUBLISHED BY OTHER AGENCIES

REPORTS	ISSUED	AGENCY
BRITISH COLUMBIA	MONTHLY (FEB.-JUNE)	WATER RESOURCES SERVICE, DEPT. OF LANDS, FOREST AND WATER RESOURCES, PARLIAMENT BLDG., VICTORIA, B.C., CANADA
CALIFORNIA	MONTHLY (FEB.-MAY)	CALIF. DEPT. OF WATER RESOURCES, P.O. BOX 388, SACRAMENTO, CALIF.

PORTLAND, OREG. 1964

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ISSUED

FEBRUARY 1, 1965

The Soil Conservation Service coordinates snow surveys conducted by its staff and many cooperators, including the Bureau of Reclamation, Corps of Engineers, Forest Service, National Park Service, Geological Survey, and other Federal Agencies, Departments of State Government, Irrigation Districts, Power Companies, and others.

The Department of Water Resources coordinates snow surveys in California.

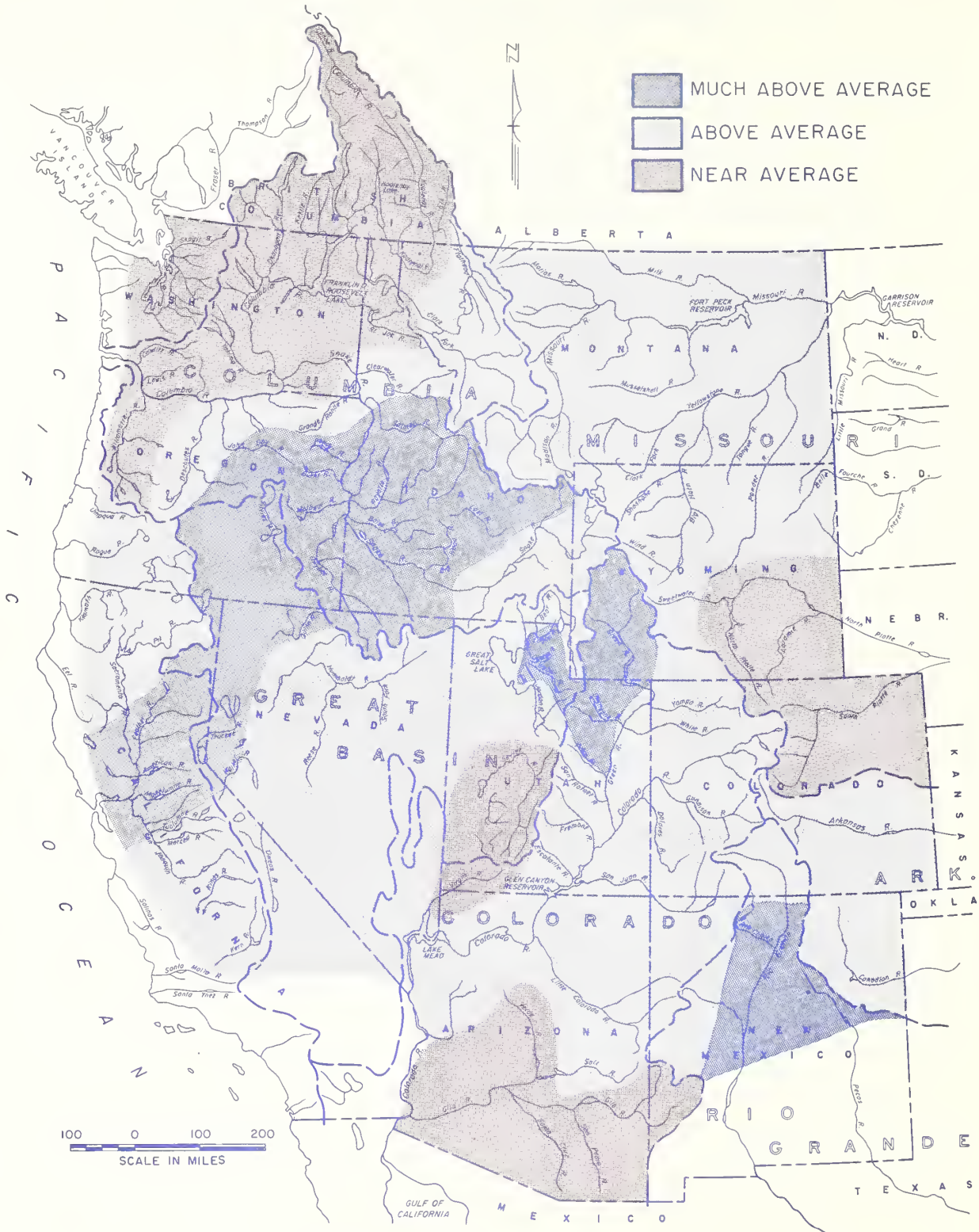
The Water Resources Service, Department of Lands, Forests, and Water Resources directs snow surveys in British Columbia.

This report was prepared by the Water Supply Forecasting Branch, Engineering Division, Soil Conservation Service, from data supplied by Snow Survey Supervisors of the Soil Conservation Service in the States of Arizona, Colorado and New Mexico, Idaho, Montana, Nevada, Oregon, Utah, Washington and Wyoming.

Data from California was supplied by the Chief, Water Supply Forecast and Snow Surveys Unit, Department of Water Resources.

Data from British Columbia was supplied by the Chief, Hydrology Division, Water Investigations Branch, Department of Lands, Forests and Water Resources.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
D. A. WILLIAMS, ADMINISTRATOR



APRIL - SEPTEMBER, 1965
PROSPECTIVE STREAMFLOW
AS OF FEBRUARY 1, 1965

WATER SUPPLY OUTLOOK

As of February 1, 1965

WATER SUPPLY OUTLOOK IS VERY FAVORABLE WEST-WIDE FOR 1965. EXCESSIVE SNOWPACKS EXIST ON SNAKE RIVER WATERSHED IN SOUTHERN IDAHO, IN NORTH CENTRAL OREGON, AND IN THE CENTRAL SIERRAS OF CALIFORNIA.

Climatic conditions for the winter of 1964-1965 to date have been characterized by heavy precipitation in all areas of the mountain west. Record and near record floods have occurred in parts of Oregon and California. Above average streamflow has been the general rule west of the Continental Divide. Mountain snowpack is above average in practically all areas, ranging generally from 125 to 175 percent of average. Highest snowpacks, near 200 percent of average, have been measured along the Snake River in south central Idaho, northern Utah, western Wyoming, and in the Central Sierras of California. Lower snowpacks in respect to average are in isolated areas of the upper Colorado River near the Continental Divide, in southern Utah, Arizona, and the Olympia Peninsula in the State of Washington.

If there is an average rate of snow accumulation through the remainder of the winter and the spring months, there will be more problems of dealing with excess snowmelt water than with water shortages, particularly in the Pacific Northwest. If late season snowfall should be deficient, there could be limited water shortages on the North and South Platte in Wyoming and Colorado, along the Arkansas and Rio Grande, and in the Sevier and Virgin rivers of southern Utah. Streamflow in these areas will probably be above average, but carryover storage in most reservoirs on these streams is extremely short.

Even with a relatively favorable outlook, surface flow will not be adequate to meet all water demands in central Arizona or areas in California where present demands always exceed the water supply.

For the first time since 1957 snowmelt season streamflow is expected to be substantially above average in the Colorado, Rio Grande, and Arkansas. These streams originate in the southern Rocky Mountain area. More streamflow than forecast would be welcome, not only to provide adequate water to meet summer demands but to improve reservoir storage levels to more favorable operating conditions.

The flow of the upper Missouri and its tributaries is expected to be well above average in Montana and Wyoming and at downstream stations on the main stem of the Missouri.

For the Columbia Basin, snowpack is above average, soils are wet, and winter streamflow has been far in excess of average. Snowpack is near average only on the headwaters of the main Columbia and the Kootenai rivers in Canada and in the Washington Cascade Range. December and January precipitation has been high over all of the United States section of the basin. In the Cascade Range of Oregon and Washington snowpack ranges from near average to 150 percent of average because warm temperatures during rainfall periods in late December and late January tended to reduce snowpack rather than increase in certain periods. In the interior mountain ranges, including the Flathead, Clark's Fork, and Snake river drainages, snow was melted only at the foothill elevations during these relatively warm periods. Snowpack on the upper Snake and its tributaries, the Lost and Wood rivers, and especially on the Boise and Payette, is near twice the average and substantially exceeds the April 1 average. Storage reservoirs in these areas are near capacity. Excess water will be difficult to control.

The flow of the lower Columbia is expected to exceed that for any year since 1956.

The California Department of Water Resources reports that water supply conditions throughout northern and central California will be well above normal for the water year. One beneficial byproduct of the devastating flood, experienced in December and early January, was the accumulation of well above normal reservoir storage on regulated streams. In addition, with the colder storms in January, snow accumulation in many mountainous areas north of the Tehachapis is substantially above normal for February 1. The Sierra snowpack, in headwater areas serving the Central Valley, is 160 percent of normal.

Southern California, outside the range of year end storms, continues to experience below normal precipitation and local runoff. However, conditions in the Colorado River Basin, the source of major supplies for this area, are much improved over last year and above normal inflow to Lake Mead is expected.

As usual, the amount of snow accumulation for the remaining winter and spring months will be of considerable importance in affect- summer streamflow.

MISSOURI BASIN

Water supply outlook is universally good throughout the Missouri Basin. The heaviest snowpack is on the tributaries forming the Missouri at Three Forks and in Yellowstone Park. To the north to the Canadian border and to the south into Colorado along the Continental Divide snowpack decreases to near 130 percent of average.

Storage in reservoirs is somewhat depleted, especially on the North and South Platte. Streamflow in this area will be adequate to meet usual irrigation and other needs and provide for some increase in reservoir storage unless demands are higher than usual.

MONTANA

East of the Continental Divide, record or near record snow water equivalents have been measured at the higher elevation snow courses in the headwaters of the Missouri and Yellowstone drainages. These are 170 to 190 percent of average for February 1. On the northern tributaries to the Missouri snow accumulation has been somewhat less, ranging near 140 percent of average. If the present pattern of snowfall continues, runoff during the snowmelt season of 1965 could exceed any record of the past 30 years.

Storage in irrigation and power reservoirs is typical for this date. No problems in filling reservoirs are anticipated. More attention to regulation may be required to control excess water.

WYOMING

Water supply outlook is good throughout the state. Heaviest snowpacks, about 150 percent of average, are in the headwaters of the Shoshone and Wind rivers, with slightly less in the North Platte. Reservoir storage tends to be below average east of the Continental Divide, especially in the North Platte. With average snowpack for the remainder of the season streamflow will be adequate to meet summer demands and probably add to carryover storage. Soil moisture under the snowpack tends to be dry, which tends to reduce forecasts from the above average snowpack.

COLORADO (South Platte)

On the South Platte, snowfall has been above average with substantial increases since the first of February. While storage is not quite up to average for all reservoirs affecting the basin, the available carryover storage is substantial. With a reasonable snowfall from now through May, water supplies for the upper and lower South Platte and its tributaries should be adequate, if not excessive, for 1965.

ARKANSAS BASIN

For the first time in five or more years mountain snowpack is above average on the Arkansas and its tributary watersheds in Colorado and northern New Mexico. A continuation of the above average snow accumulation rate would be desirable to overcome an extreme shortage in reservoir storage and other effects of two or more years of drouth. Adequate water supplies are by no means assured for 1965 but the outlook is much more favorable than that for the 1964 season.

Streamflow on the Canadian in New Mexico may be expected to exceed average but storage for the Tucumcari area is near minimum of record.

RIO GRANDE BASIN

In Colorado, the snow cover on the headwaters of the Rio Grande is the best in the state, about 150 percent of average. Snowpack is the highest for any February 1 since 1952. Water supply outlook is comparable to or better than for the most recent above average years of 1957 and 1958. Storage is below average.

Even though the flow of the Rio Grande through New Mexico is expected to be well above the 1948-62 average and that of the past few years, streamflow and reservoir storage will be short of that necessary to meet all possible demands. Storage for both the Middle and Lower Rio Grande irrigated areas is near minimum as has been the situation for several years. Much additional snowfall would be welcome.

COLORADO BASIN

The trend to above average prospective streamflow also extends to the upper Colorado River Basin. Forecast of inflow to Lake Powell is nearly twice that which occurred in 1964 and more in relation to the extremely low year of 1963. If the present rate of snow accumulation continues, and it has since February 1, more optimum operating conditions for the major reservoirs will be restored. As with other areas of the southwest, which have suffered drouth in recent years, further heavy snowfall would be helpful. Overall storage in the large reservoirs remains low, only slightly above that of a year ago.

COLORADO

West of the Continental Divide snowpack ranges from 120 to 140 percent of normal with the heaviest snowpack on the San Juan and Dolores watersheds in southwestern Colorado. Unless there is an extreme deficiency in snowfall for the remainder of the season water

SUMMARY OF SNOW WATER EQUIVALENT MEASUREMENTS FEBRUARY 1, 1965

MAJOR BASIN AND SUB — WATERSHED	WATER EQUIVALENT IN PERCENT OF: LAST YEAR	AVERAGE
MISSOURI BASIN		
Jefferson	177	157
Madison	190	180
Gallatin	181	165
Missouri Main Stem	124	138
Yellowstone	194	172
Shoshone	170	154
Wind	182	148
North Platte	208	133
South Platte	210	119
ARKANSAS BASIN		
Arkansas	224	130
Canadian	286	135
RIO GRANDE BASIN		
Rio Grande (Colo.)	367	149
Rio Grande above Otowi Bridge	345	141
Pecos	320	183
COLORADO BASIN		
Green (Wyo.)	202	192
Yampa - White	172	126
Duchesne	337	164
Price	362	155
Upper Colorado	202	119
Gunnison	160	118
San Juan	358	146
Dolores	268	147
Virgin	240	103
Gila	380	118
Salt		110
GREAT BASIN		
Bear	190	168
Logan	194	165
Ogden	160	138
Weber	248	172
Provo - Utah Lake	224	144
Jordan	218	172
Sevier	205	116
Walker - Carson	248	192
Tahoe - Truckee	194	175
Humboldt	109	125
Lake Co. (Oregon)	116	150
Harney Basin (Oregon)	121	121
UPPER COLUMBIA BASIN		
Columbia (Canada)	81	90
Kootenai	120	105
Clark Fork	133	134
Bitterroot	133	150
Flathead	153	126
Spokane	111	105
Okanogan	107	105
Methow	97	104
Chelan	109	86
Wenatchee	104	132

MAJOR BASIN AND SUB — WATERSHED	WATER EQUIVALENT IN PERCENT OF: LAST YEAR	AVERAGE
SNAKE BASIN		
Snake above Jackson, Wyo.	180	160
Snake above Hiese, Idaho	177	158
Snake above American Falls Res	193	175
Henry's Fork	207	193
Southern Idaho Tributaries	168	175
Big and Little Wood	220	225
Boise	211	200
Owyhee	107	140
Payette	198	172
Malheur	106	165
Weiser	168	165
Burnt	154	174
Powder	167	171
Salmon	167	183
Grande Ronde	157	156
Clearwater	122	130
LOWER COLUMBIA BASIN		
Yakima	100	123
Umatilla	113	134
John Day	161	163
Deschutes - Crooked	145	140
Hood	105	128
Willamette	109	130
Lewis	104	130
Cowlitz	97	116
PACIFIC COASTAL BASIN		
Puget Sound	94	126
Olympic Peninsula	90	83
Umpqua - Rogue	117	144
Klamath	123	146
Trinity	125	120
CALIFORNIA CENTRAL VALLEY		
Upper Sacramento	215	130
Feather	230	160
Yuba	260	155
American	280	170
Mokelumne	300	165
Stanislaus	310	170
Tuolumne	300	165
Merced	320	160
San Joaquin	350	160
Kings	340	155
Kaweah	330	150
Tule	370	150
Kern	400	140

Data for California Watersheds supplied by Dept. of Water Resources, and for British Columbia Watersheds by Dept. of Lands, Forests and Water Resources.

Average is for 1948-62 period.

Based on Selected Snow Courses determined by Distribution within the Basin, Length of Record and Repetitive Monthly Measurement Schedules.

SELECTED STREAMFLOW FORECASTS APRIL-SEPTEMBER FEBRUARY 1, 1965

STREAM AND STATION	1000 ACRE-FEET		PERCENT OF AVERAGE
	FLOW 1964	FORECAST 1965	
UPPER MISSOURI			
Clark Fork at Chance, Montana			
Gallatin near Gateway, Montana			
Jefferson at Sappington, Montana			
Madison near Grayling, Montana 1/			
Missouri near Zortman, Montana 2/			
Missouri near Williston, N. Dakota 3/			
Yellowstone at Corwin Springs, Montana			
Yellowstone at Miles City, Montana			
Shoshone below Buffalo Bill Res., Wyoming 4/		1050	130
Wind at Dubois, Wyoming		132	132
PLATTE			
Clear at Golden, Colorado 5/		150	112
North Platte at Saratoga, Wyoming		765	119
Cache LaPoudre near Ft. Collins, Colorado 6/		290	118
ARKANSAS			
Arkansas at Salida, Colorado 7/		410	118
RIO GRANDE			
Rio Grande near Del Norte, Colorado 8/		650	132
Rio Grande at Otowi Bridge, New Mexico 9/		950	155
Pecos at Pecos, New Mexico *		80	150
UPPER COLORADO			
Animas at Durango, Colorado		640	140
Colorado at Glenwood Springs, Colorado 10/		1840	118
Colorado near Cisco, Utah		5200	137
Colorado, Inflow to Lake Powell, Arizona **		9600	125
Duchesne near Tabiona, Utah 12/		164	144
Green, Inflow to Flaming Gorge Res., Utah **		1650	146
Green near Green River, Utah 13/		4650	138
Gunnison near Grand Junction, Colorado		1750	134
Price near Scofield, Utah 14/		55	149
San Juan near Bluff, Utah 15/		1650	141
White at Meeker, Colorado		435	130
Yampa at Steamboat Springs, Colorado		340	116
LOWER COLORADO			
Gila near Solomon, Arizona (Jan-May)		87	65
Salt at Intake, Arizona (Jan-May)		434	136
Verde above Horseshoe Dam, Arizona (Jan-May)		219	118
GREAT BASIN			
Bear at Harer, Idaho 16/		465	108
Logan near Logan, Utah 17/		190	143
Ogden, Inflow to Pine View Res., Utah 18/		180	140
Provo at Vivian Park, Utah 19/		215	149
Sevier at Hatch, Utah 20/		48	107
Sevier near Kingston, Utah		23	94
Humboldt at Palisades, Nevada **		225	130
Truckee at Farad, California ** 21/			
West Walker near Coleville, California **		210	150

Forecasts in California provided by Department of Water Resources.
Average is for 1948-62 period except California. California is computed for 1908-57 period.
Forecasts assume average Effective Climatic Conditions from Date Through Snow Melt Season.

SELECTED STREAMFLOW FORECASTS

APRIL-SEPTEMBER

FEBRUARY 1, 1965

STREAM AND STATION	1000 ACRE-FEET		PERCENT OF AVERAGE
	FLOW 1964	FORECAST 1965	
UPPER COLUMBIA			
Bitterroot near Darby, Montana	730		
Chelan at Chelan, Washington 22/			
Clark Fork above Missoula, Montana	2130		
Clark Fork at Whitehorse Rapids, Montana 23/		17500	122
Columbia at Revelstoke, British Columbia			
Columbia at Birchbank, British Columbia 24/			
Columbia at Grand Coulee, Washington 24/	70253	72630	103
Columbia at The Dalles, Oregon 24/	108696	124400	114
Flathead near Polson, Montana 23/	8553		
Kootenai at Wardner, British Columbia			
Kootenai at Leonia, Idaho	9037	9050	97
Okanogan near Tonasket, Washington		1970	100
Spokane at Post Falls, Idaho 25/		3900	114
SNAKE			
Big Lost, Inflow to Mackay Res., Idaho 26/		265	180
Big Wood, Inflow to Magic Res., Idaho 27/		500	189
Boise above Diversion Dam, Idaho 28/		2800	172
Clearwater at Spalding, Idaho		11150	121
Malheur near Drewsey, Oregon		177	216
Owyhee Res. Net Inflow, Oregon 18/		620	163
Payette near Horseshoe Bend, Idaho 29/		2800	141
Salmon at Whitebird, Idaho		10400	150
Snake near Heise, Idaho 30/		4800	124
Snake at Weiser, Idaho			
LOWER COLUMBIA			
Cowlitz at Castle Rock, Washington			
Deschutes at Benham Falls, Oregon 31/			
Grande Ronde near LaGrande, Oregon		248	122
Hood near Hood River, Oregon 32/		470	123
Willamette at Salem, Oregon 33/		5845	105
Yakima near Parker, Washington 34/		1900	94
NORTH PACIFIC COASTAL			
Dungeness near Sequin, Washington			
Rogue at Raygold near Central Point, Oregon		1250	125
Klamath Lake, Net Inflow, Oregon 35/		800	125
CALIFORNIA CENTRAL VALLEY 36/**			
American, Inflow to Folsom Res., Calif.	912	2020	146
Feather near Oroville, Calif.	1165	2850	147
Kaweah near Three Rivers, Calif. 37/	163	350	133
Kern near Bakersfield, Calif.	183	515	119
Kings, Inflow to Pine Flat Res., Calif.	615	1500	128
Merced, Inflow to Exchequer Res., Calif.	310	795	128
Mokelumne, Inflow to Pardee Res., Calif.	309	690	144
Sacramento, Inflow to Shasta Res., Calif.	1183	2100	117
San Joaquin, Inflow to Friant Res., Calif.	643	1520	125
Stanislaus, Inflow to Melones Res., Calif.	432	1000	136
Tule, Inflow to Success Res., Calif.	33	75	134
Tuolumne, Inflow to Don Pedro Res., Calif.	743	1560	129
Yuba at Smartville, Calif.	767	1400	124

Explanatory Notes on Forecasts Listed on Inside Back Cover.
** April - June Period* *** April - July Period*

supplies will be adequate for local needs along the principal tributary streams. Soil moisture in mountain areas is near average.

UTAH

Colorado River tributaries in Utah have an extremely heavy snowpack even though January increases tended to be much below average. While these are not major contributors to the lower Colorado River, flow from these streams add something to the favorable outlook. The only exception is the Virgin River in extreme southwestern Utah where streamflow is forecast at about 75 percent of average.

The Green River, originating in Wyoming, has the best snowpack as of February 1 for any watershed in the basin, almost 200 percent of average on its headwaters.

ARIZONA

Water supply outlook for irrigated areas of Arizona ranges from fair on the Gila River to average on the Salt, Verde, and Little Colorado rivers. Snow cover is below average at lower elevations but well above average at 8000 to 9000 feet and higher elevations. Combined flow of the Salt, Verde, and Tonto rivers totalled 245,000 acre-feet during January, over twice the average. On the other hand, the Gila River flowed less than half the usual amount as it enters the Safford Valley.

As a result of heavy January flows storage in Salt River reservoirs is slightly above average. Storage in San Carlos is below average. Water supplies will be adequate with the exception of the upper Gila and San Carlos Projects where supplemental pumping will be necessary.

GREAT BASIN

UTAH

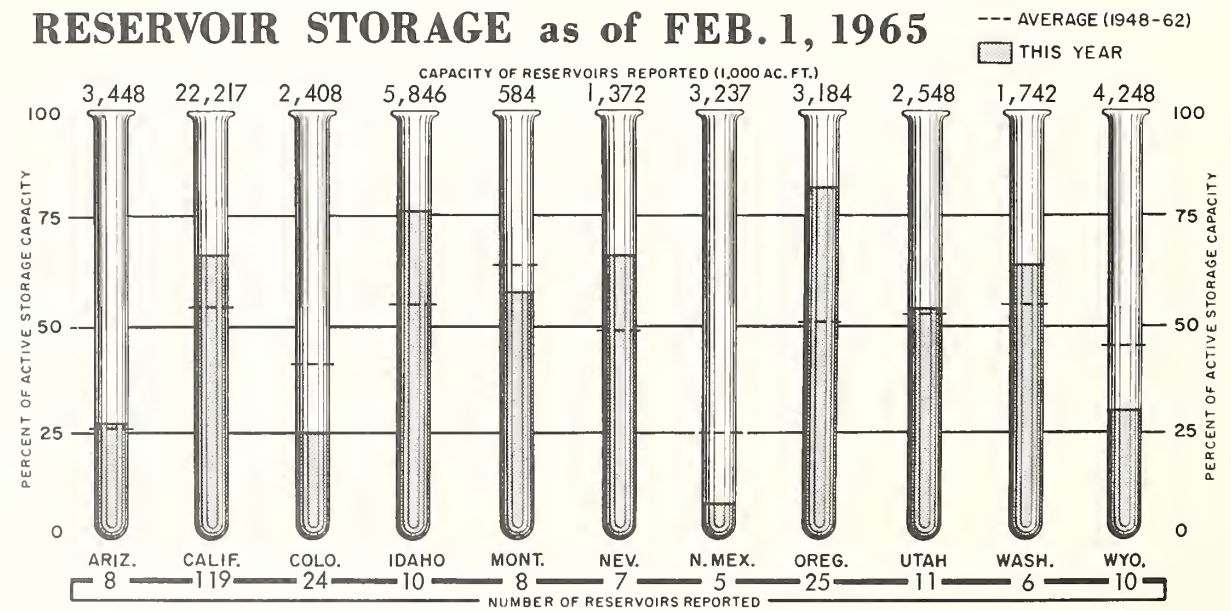
Even with deficient January precipitation, water supply outlook from Loa to Salina and northward into Idaho and Wyoming is excellent. Snow accumulation ranged from 145 to 170 percent of average on February 1. With average snowfall during the next two months total seasonal snow will be near that recorded for the extremely high year of 1952. Highest streamflow forecasts are for streams originating in the mountains near Salt Lake City. Overall storage is near average in this area.

On the Sevier and adjacent streams in southwestern Utah outlook is not so favorable with below average streamflow in prospect at this time.

NEVADA

Water users in western and northern Nevada will have a very good to excellent 1965 irrigation season water supply. Reservoir storage is 136 percent of the February 1 average and 66 percent of capacity. Mountain soils are very wet.

The south central and south Nevada snowpack is below normal, as it was this date last year. With normal conditions the next two months, East Slope Sierra streams from the Walker on the south to Surprise Valley on the north will flow in the 125 to 150 percent of average range. At times, dependent on melt conditions during the April-July runoff period, streamflow will exceed water users' needs.



STORAGE IN LARGE RESERVOIRS — FEBRUARY 1, 1965

BASIN AND NAME OF RESERVOIR	CAPACITY (1000 A.F.)	STORAGE (1000 A.F.)
UPPER MISSOURI		
Boysen	560	326
Buffalo Bill	380	174
Canyon Ferry	2043	1831
Hebgen	385	221
Tiber	1316	657
Belle Fourche	185	127
Keyhole	190	113
Fort Peck	19105	15290
Fort Randall	6100	3055
Garrison	24500	14244
Oahe	23600	8889
PLATTE		
Glendo	786	290
Pathfinder	1011	91
Seminoe	982	435
Colo-Big Thompson (4)	865	310
ARKANSAS		
Conchas	370	102
John Martin	367	1
RIO GRANDE		
Elephant Butte	2207	123
El Vado	194	2
UPPER COLORADO		
Flaming Gorge	3789	969
Navajo	1709	330
Powell	28040	6197
LOWER COLORADO		
Havusu	619	541
Mead	27207	11289
Mohave	1810	1690
San Carlos	1206	57
Salt River Res. (4)	1755	726
Verde River Res. (2)	322	104
GREAT BASIN		
Bear	1421	906
Lahontan	286	212
Rye Patch	179	116
Sevier Bridge	236	41
Strawberry	270	62
Tahoe	732	510
Utah	1149	403

BASIN AND NAME OF RESERVOIR	CAPACITY (1000 A.F.)	STORAGE (1000 A.F.)
UPPER COLUMBIA		
Chelan	676	334
Coeur d'Alene	238	237
Flathead	1791	1384
Hungry Horse	2982	2811
Kootenay	673	662
Pend Oreille	1155	1026
Roosevelt	5232	4427
LOWER COLUMBIA		
Detroit	300	194
Hills Creek	249	50
Lookout Point	337	142
Yakima Res. (5)	1065	764
SNAKE		
American Falls	1700	1242
Arrowrock	287	282
Anderson Ranch	423	358
Brownlee	1427	1328
Cascade	653	441
Jackson	847	610
Lucky Peak	278	
Palisades	1202	973
Owyhee	715	687
PACIFIC COASTAL		
Clear Lake	440	232
Upper Klamath	584	558
Ross	1203	916
Trinity	2500	2118
CALIFORNIA CENTRAL VALLEY		
Almanor	1036	727
Berryessa	1602	1612
Cachuma	205	137
Casitas	254	40
Cherry Valley	268	121
Don Pedro	290	185
Folsom	1010	580
Hetch-Hetchy	360	241
Isabella	570	129
McClure	281	256
Millerton	521	424
Nacimiento	350	153
Pardee	210	182
Pine Flat	1013	509
Shasta	4500	3249

Reservoir Storage Data Provided by Bureau of Reclamation, Corps of Engineers, Geological Survey, and water using organizations. Data from California and British Columbia provided by Department of Water Resources and Department of Lands, Forests and Water Resources, respectively.
Average 1948-62 except California 1955-64.

COLUMBIA BASIN

The United States section of the Columbia Basin along with adjacent areas of Oregon, California and Nevada has had extremely high precipitation during the past two months of December and January. Near record runoff and streamflow stages have been recorded in streams from the Oregon Cascades and in some other areas. The precipitation has left heavy snowpacks over all the basin, particularly at higher elevations in the interior. Heaviest snowpack with the greatest potential for excessive water during the snowmelt season and before this date exists on the watersheds of the Boise, Salmon, Lost and Wood rivers in southwestern Idaho. Snowpack on the Columbia and its tributaries in Canada and on the northern Washington Cascades is near average.

At this time the most probable flow of the Columbia at The Dalles is about 124,000,000 acre-feet or 114 percent of average for the April-September 1965 period. Relatively heavy contributions are expected from the Snake River watershed. This flow is slightly in excess of that for April-September 1964 and the greatest since 1956.

BRITISH COLUMBIA

The British Columbia Water Resources Service reports that on February 1 snow cover was above average at lower elevations for most watersheds in the province. High elevation snowfall has been near average to date except for the Kootenai River Basin and southern portions of the Columbia Basin just north of the International Boundary. In these areas high elevation snow tends to be slightly above average.

MONTANA

Snow accumulation west of the Continental Divide is near the April 1 average as of February 1, varying from 125 percent of average on the Flathead to 150 percent of average on the Bitterroot. Reservoir storage is near capacity. Summer flow will no doubt be well in excess of normal from Montana tributaries.

IDAHO

Snow cover is critically high on the Big and Little Lost, the Big and Little Wood, and Boise rivers in Idaho. Here, snow accumulation to date is near 200 percent of average for February 1 and exceeds the April 1 average by substantial amounts. Heavy precipitation through the fall and winter season to date has left saturated soils at both valley and mountain elevations. Storage capacity that usually is available to help control snowmelt flows is almost completely filled. The heavy snowpack extends to low elevations which may be expected to melt well before the usual snowmelt peaks in May or early June. The volumes of flow represented in the present snowpack are so great that even the warmest and driest spring of experience would produce some degree of damaging flows on these rivers.

Elsewhere on the upper Snake and tributaries in southern Idaho seasonal snowfall to date is 150 percent or more of the February 1 average. Snowpack is also excessive on the Salmon and Clearwater watersheds. Northern Idaho has a near average snowpack, largely because much of the precipitation has been rainfall during the past two months.

OREGON

Abundant water supplies for irrigation in Oregon for the 1965 season are assured. Watershed soils are near the saturation point. Water content of the mountain snowpack is much above the 1948-62 average, varying between 140 and 174 percent in most of the state. Lowest readings were obtained on the Walla Walla where the snow is just average, on the Umatilla and Hood rivers 134 and 128 percent respectively, and on the Willamette 130 percent.

Stored water is greater this year than at any time since water supply outlook reports were first prepared in 1935 and is equal to 82 percent of the total capacity. Many reservoirs are now spilling water to allow space for flows yet to come. Flows of key Oregon streams in January, second consecutive month with river flooding, varied from a low of 154 percent average on the Deschutes to a high of 518 percent on the Owyhee.

Forecasts of expected streamflow in the 1965 irrigation season, April through September, vary from slightly more than average west of the Cascades on up to double the average on such streams as the Malheur, Silvies, Silver Creek and at John Day Middle Fork.

Water supply is very favorable for the Harney Basin and Lake County areas of Oregon.

WASHINGTON

The water supply outlook for irrigation and power for Columbia Basin streams in Washington is very good as of this date. Snow accumulation has not been as excessive as in mountain areas of adjacent states. Heaviest snow is on the southern half of the Cascade range of the Yakima, Wenatchee and Lewis rivers. Near average snow for this date is present on the Chelan, Okanogan and Spokane in northern Washington.

Watershed soils are wet. Reservoir storage is above normal with the exception of the Conconully and Salmon Lake reservoirs on the Okanogan tributaries.

CALIFORNIA

The California Department of Water Resources, coordinating agency for snow surveys and water supply forecasting, reports that prospects for an above normal water supply in California during this water year is almost assured. This favorable outlook can generally be attributed to the rainfall that caused the devastating North Coastal floods and resulted in substantial gains in reservoir storage and snow accumulation in northern and central California. Conversely, southern California, perhaps somewhat jealously observing the ocean bound torrents in northern California, continued to experience below normal precipitation with prospects for another season of deficient local runoff.

The Christmas and early January storms that caused the flooding conditions in the North Coastal area, the Sacramento, and northern San Joaquin valleys also materially contributed to factors most important for establishing favorable spring and summer runoff conditions.

Precipitation to date for much of this area is equal to or exceeding that normally expected for the water year. Although the valley area of flooding is still reeling from the results of flood flows approximating or exceeding those of record, the primary aspect of runoff to date as far as water conditions are concerned is that it has been sufficient to fill available storage and this apparently it has done. Significantly contributing to the above average situation is the storage in major reservoirs of the Central Valley, especially those in the San Joaquin Valley where aggregate storage is greater than it has ever been on this date, equal to 150 percent of the 10-year average. But all in all, it is the heavy accumulation of water in the snow zone of the state, especially in the Sierra Nevadas, that establishes this year's potentially favorable spring and summer runoff conditions.

Statewide, the water contents of the snowpack is 155 percent of its February 1 average. In the Sierra Nevada, the February 1 water content is already equal to that of the April 1 average. In a normal year about 55 percent of the April 1 snowpack and about 50 percent of the season's total precipitation is expected to accumulate by February 1. Based upon February 1 snowpack, and assuming normal precipitation during the remainder of the season, forecasts of runoff for the April 1 to July 31 period range from a high of 145 percent of normal for both the Feather and American rivers to 120 percent of normal for the Kern River in the south, and for the inflow to Shasta Reservoir at the north of the Central Valley.

Snowpack measurements were made at 214 snow courses and 118 aerial snow depth markers throughout the state on or about February 1. The present snowline ranges from about 4000 feet in the northern river basins to 5000 feet in the Central Sierra. In the southern Sierra the effective snowline is about 6000 feet. Ordinarily, these would be high for February and indicate a somewhat reduced snow pack accumulation. However, as previously noted, snow course measurements show that although the snowline is rather high the existing water content is unusually good for February 1.

Reservoir storage throughout the state is generally above normal for this date, averaging about 120 percent of normal February 1 level. With the prospect of substantial snowmelt runoff during the later spring and summer, firm yield conditions should be the rule for all major storage works. The possibility also seems strong for the availability of substantial amount of surplus water in the Central Valley, although the timing of the snowmelt runoff will be the determining factor in estimating this potential.

EXPLANATION of STREAMFLOW FORECASTS

1/ Observed flow adjusted for change in storage in Hebgen Lake. 2/ Observed flow adjusted for change in storage in Canyon Ferry and Tiber reservoirs. 3/ Observed flow adjusted for change in storage in Canyon Ferry, Tiber, Fort Peck, Buffalo Bill, and Boysen reservoirs. 4/ Observed flow adjusted for change in storage in Buffalo Bill Reservoir plus Heart Mt. Diversion. 5/ Observed flow minus diversion through Jones Pass Tunnel.

6/ Observed flow minus diversions from North Platte, Colorado, and Laramie rivers plus measured diversions for irrigation and municipal use above station. 7/ Observed flow adjusted for change in storage in Clear Creek, Twin Lakes. and Sugar Loaf reservoirs minus trans-mountain diversions through Busk-Ivanhoe and Twin Lakes tunnels and Ewing, Fremont, Wurtz, and Columbine ditches. 8/ Observed flow adjusted for change in storage in Santa Maria, Rio Grande, and Continental reservoirs. 9/ Observed flow adjusted for changes in storage in reservoirs listed in (8) plus Terrace, Sanchez, Platoro, and El Vado reservoirs. 10/ Observed flow adjusted for changes in storage in Granby Reservoir plus diversions through Adams Tunnel and Grand River Ditch.

11/ Observed flow adjusted for changes in storage in Flaming Gorge, Navajo, and Lake Powell. 12/ Observed flow plus diversion through Duchesne Tunnel. 13/ Observed flow adjusted for changes in storage in Flaming Gorge and Big Sandy reservoirs. 14/ Observed flow adjusted for change in storage in Scofield Reservoir. 15/ Observed flow adjusted for change in storage in Navajo Reservoir.

16/ Observed flow. 17/ Observed flow plus Utah Power and Light Tailrace and Logan, Hyde Park, and Smithfield canals. 18/ Record computed by Bureau of Reclamation. 19/ Observed flow adjusted for change in storage in Deer Creek Reservoir, minus diversions through Duchesne Tunnel and Weber-Provo Canal, plus diversion through Salt Lake Aqueduct. 20/ Observed flow.

21/ Observed flow exclusive of Lake Tahoe and adjusted for change in storage in Boca Reservoir. Forecast by Truckee Basin Water Committee. 22/ Observed flow adjusted for change in storage in Lake Chelan. 23/ Observed flow adjusted for change in storage in Flathead and Hungry Horse reservoirs. 24/ Observed flow adjusted for change in storage in any or all of the following reservoirs above the station: Kootenay, Hungry Horse, Flathead, Pend Oreille, Coeur d'Alene, F. D. Roosevelt, Lake Chelan, Noxon, and Brownlee; and pumping from F.D.R. Lake. 25/ Observed flow adjusted for change in storage in Coeur d'Alene Lake plus diversions to Spokane Valley Farms and Rathdrum Prairie canals.

26/ Observed flow adjusted for change in storage in Mackay Reservoir plus diversion in Sharp Ditch. 27/ Combined flow of Big Wood near Belleview and Camas Creek near Blaine. 28/ Observed flow adjusted for changes in storage in Lucky Peak, Anderson Ranch, and Arrowrock reservoirs. 29/ Observed flow adjusted for changes in storage in Cascade and Deadwood reservoirs. 30/ Observed flow adjusted for changes in storage in Palisades and Jackson reservoirs.

31/ Observed flow adjusted for changes in storage in Crane Prairie, Wickiup, and Crescent Lake reservoirs. 32/ Adjusted to natural flow. 33/ Observed flow adjusted for changes in storage in Lookout Point, Detroit, Cottage Grove, Dorena, and Hills Creek reservoirs. 34/ Observed flow adjusted for changes in storage in Keechelus, Kachess, Cle Elum, Bumping, and Tieton reservoirs, plus diversions by Rosa, New Reservation, Old Reservation, and Sunnyside canals. 35/ Flow records provided by PP&L and USBR.

36/ All forecasts are for unimpaired streamflow except Kaweah River. 37/ Not corrected for upstream impairments. All other forecasts are for observed flow.

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